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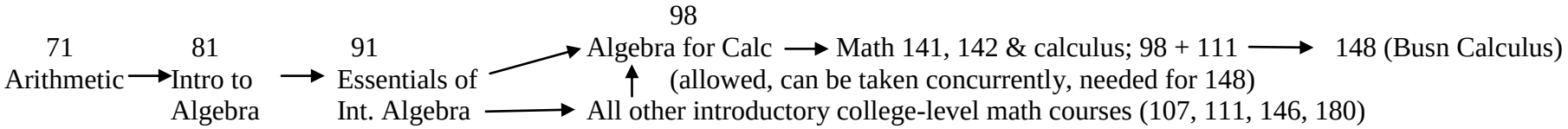
Course Sequence Flowchart:



Curriculum Aims to Develop

Process strands	Content strands
1. Successful student habits and attitudes 2. Critical-thinking ability 3. Quantitative reasoning ability 4. Effective communication ability	5. Number sense 6. Geometric sense (graphing-analytic geom.; develop visual sense) 7. Statistical reasoning 8. Facility with formulas 9. Understanding of functions

Guiding Philosophy/Goals for Curriculum

We want our developmental mathematics sequence to:

- Actively (and demonstrably) develop students'
  - reasoning ability (critical thinking/quantitative reasoning),
  - learning habits/attitudes,
  - communication ability,
  - understanding of core concepts in several major strands of mathematics (numeracy, geometry, statistics, algebra, and functions), and
  - skill with essential mathematical techniques (those **routinely used by practitioners** in a wide range of disciplines).

- Feel relevant and useful to the students by
  - providing **in each class** training in a skill or perspective which has immediate application to their lives/current non-math coursework,
  - and reserving intensive training in specialized algebraic techniques for only those who require it (students needing calculus).

- Limit the amount of precollege-level work required for students to be ready for the quantitative demands of college-level coursework.

We see the purpose of mathematics training for nonspecialists being the development of

- critical thinking skills,
- quantitative reasoning ability, and
- symbolic reasoning ability (*e.g.* symbols as shorthand, graphical/diagrammatic representations, tabular representations, computation with/simple manipulation of formulas).

Summary of Major Components of Reform

Mathematical content will be thought of in terms of five strands:

- Number Sense
- Geometric Sense
- Statistics
- Formulas (using algebraic symbols to compute and communicate)
- Functions (examining relationships, including with graphs)

Students will also be trained in four additional areas (strands):

- Successful habits and attitudes (especially engaging intellectually and taking responsibility for their own learning)
- Thinking critically (developing awareness of, and utilizing, a process for solving problems of all types, not just mathematical)
- Reasoning quantitatively (interpret, question, estimate, evaluate, defend, and seek implications of graphical and tabular data)
- Communicating effectively (to faculty, peers, and self, especially around their own confusion)

Contexts used for the teaching of these topics will emphasize relevance to the students' lives:

- College operations: grade computation, GPA, financial aid, …
- Mathematics used in non-math courses most commonly taken by these students: *e.g.* formulas from intro business, science, etc.
- Using computers: spreadsheets, search engines, graphics
- Personal finance: budgeting, comparison shopping for cell phones, credit cards/banking, loans
- Demographics: college, community, state, national; can include issues of equity

Pedagogy will include:

- Activity-driven instruction, especially involving groups [lecture-style instruction CAN be blended with this]
- Mastery testing of core topics in each course
- Collectively examining students' achievement of learning outcomes at each course level

Other elements needing attention:

- Placement process (Use custom WAMAP? Follow SFCC's lead?)
- Development of instructional materials
- Ongoing faculty training and support (structured faculty learning communities, emotional support, development & reflection time)
- Implications for prerequisites and advising (within the institution) and transferability (between institutions, DTA)
- Transition experience for students (into sequence from previous experiences, out of sequence into traditional courses)

Significant Questions Affecting this Project:

- Is there a reason to believe that it is possible to adjust 32 students' assumptions about learning and mathematics, develop their cognition to specific levels, and achieve specific levels of mathematical content mastery within 10 weeks of instruction?

  - Comments from students in Angi Caster's, Barbara Clinton's, and Susan Landgraf's courses indicate that students hunger for and greatly appreciate the opportunity to communicate their own views and examine issues of interest to them. One of Angi Caster's successes in Writing 105 is helping students learn to use sophisticated and valid resources and reasoning (*i.e.* academic, college-level) to examine their own beliefs about the world. When students start with the latter and are provided well-chosen parameters (examining multiple points of view, using academic sources) and training (in databases, reading, reasoning), they are transformed, internalizing and owning much of what is taught and see it as applicable to their ongoing process of understanding of the world. **This may be a necessary focus for students at the precollege level in mathematics – they may not recognize that training in the academic disciplines provides a secular way to examine the same fundamental questions addressed by religious training: why are we here, why do things happen the way they do, and how are we supposed to understand and interact with other human beings?**

  - Is our success with this project essentially dependent upon students having a time and place for structured conversations about their assumptions about and experiences with learning? [They may need a way to systematically examine and discuss the learning process, including their expectations/assumptions about knowledge and the purpose/value of learning (beyond certification/training for employment).]

  - Do students in precollege (math) courses at a community college – or particular subgroups, such as 1st generation college, 18 – 20 years old, or Hispanic – typically have categorizable differences in beliefs about the nature of knowledge, purpose of education, strategies for learning, and their own potential which present strong barriers to their ability to succeed in the college setting?

- What pedagogical **and social** activities are necessary to develop cognition – especially deductive reasoning, self-evaluation of learning, pattern recognition, attention to detail, and curiosity and reflective inquiry?

- What pedagogical **and social** strategies are ESSENTIAL for successful instruction of adult learners? (In practical terms, how can we help an instructor judge whether his/her alternative approach is effective and persuade him/her to change? Are there gains that can be measured in a short period of time?)

- What are developmental milestones toward these goals? (How do we measure incremental progress in each course rather than "mastery" at a specific point in the sequence?)

- Given that most math faculty at postsecondary institutions received no training around the aforementioned issues, what reading/training is realistic to require of faculty preparing to deal with these matters? (*E.g.* National Research Council's *How We Learn*, Stephen Brookfield, Rita Smilkstein & brain science)

- How do we help faculty (& students) develop and maintain awareness of ways in which any activity is addressing multiple learning goals simultaneously?

- What distinguishes "precollege" from "college" level work, other than tradition?
  - Can – or should – it now be defined in terms of cognition?
    - Placement of content along the continuum from concrete to abstract? (What qualifies an idea/topic as "abstract"?)
    - Amount of thinking at the different levels of Bloom's Taxonomy? (*e.g.* Is precollege learning 70% knowledge acquisition and execution, and 30% on analytic/synthetic thinking about concepts while college-level is the reverse?)

  - Is it a focus on broader concepts or those with more components, does it investigate ideas more deeply, is it about specialization?

  - Why are calculus, voting theory, and statistics "advanced" topics? Do they require greater analytic/synthetic reasoning? Are they more "conceptual" (and what does that term mean)?

- As we set goals for content achievement in the various math courses, what will we do with those error patterns that are "instruction-resistant," meaning they require sustained or very specialized instruction to correct, and may exceed the time realistically available within the 10 weeks? [Do we already know what those patterns are? Will instructors of subsequent courses simply have to accept a certain portion of their class will continue to make such errors? Can they be addressed through independent learning activities done in MRC?]

Other relevant ideas:
- Can Maslow's Hierarchy and Perry's Scheme for Social and Ethical Development identify aspects of students' life situation and worldviews which facilitate or hinder successful learning, or offer insight into strategies for improving student achievement?
- Is the best way to help students commit to learning new behaviors by peer interaction with the instructor facilitating a discussion to break down assumptions? In particular, have students work on learning activities together (not necessarily during class) and discuss what they notice about successful students. Highlight stereotypes reinforced by their observations (*e.g.* Asian students are better at math) and allow the successful students themselves dispel that their success is due to genetic factors rather than culture, expectations, and habits.
- The quickest way to lose an audience is to deny their reality.
- If a student plans to "study" for two hours and is confused within five minutes, what should she/he do to make the remaining hour and 55 minutes a productive learning experience?

NEW Math 81 – Final Draft of Learning Goals (Sept 28, 2009) – Dev Ed Group

Number Sense

- Fraction arithmetic
- Signed arithmetic
- Unit conversions (context for proportions)
    - Mph (rates), mixed units, cross unit systems
- Percents are embedded throughout curriculum, but not taught at this level
- Estimation is embedded (decimal equivalents to key fractions)

Geometry

- Area and perimeter of circles, triangles, rectangles
- Volume of boxes

Statistics

- Interpret bar, line, and pie graphs
- Interpret data tables
- Represent data graphically
    - Less formal treatment of Cartesian (Quadrant 1 – newspaper graphing); graphing formulas is taught in Math 91

Formulas

- Evaluating expressions (that matter)
- Simplifying expressions (average cost)
    - Polynomial algebra (adding, subtracting, multiplying up to binomials, division of monomials) and the exponent rules needed to do this
- Solve linear equations [Quadratic , no linear term, in M91 for now]
- Solve literal equations (basic: d = rt; D = m/v; temperature formula; no A = P + Prt types)
- Inequalities – embedded concept throughout (including compound idea, allows us to discuss piecewise)
    - Solving basics (linear in 1 variable, realistic)

NEW Math 91 – Final Draft of Learning Goals (Oct 7, 2009) – Dev Ed Group

Graphing calculators will be used in this course.

Number Sense – incorporate into related topics: exponents, quadratic function, distance formula

- Estimating and computing square, cube, and higher roots of numbers

Geometry

- Pythagorean theorem, distance formula

Statistics – may incorporate throughout the quarter such as applying to discussions of class performance

- Summarizing data
  - Mean, median, mode
  - 5-number summary (some measure of spread)
  - Histogram or box plot; regression lines (see functions)

Formulas

- Solve more complex linear equations (with fractions, simplifying)
- Solve linear inequalities in one variable (express with graphs, interval notation)
- Use compound inequalities and interval notation to describe regions/sets
- Simplifying with exponents (all rules with integer exponents)
- Solve systems of linear equations in two variables (graphing & elimination methods)

Functions

- Concept and notation of functions – include absolute value, piecewise (visually)
- Domain and range
- Properties/features of functions (max/min, incr/decr, pos/neg, zeros, rate of change?)
- Linear functions
  - Intercepts
  - Slope
  - Slope-intercept form; present point-slope form
  - Facts about vertical, horizontal, parallel & perpendicular lines (equations, slope relationships)
  - Constructing from pairs of points
  - Regression lines
- Exponential functions
  - Behavior
  - Intercept
  - Asymptotes
  - Constructing from pairs of points; Applications – finance, population growth
- Quadratic functions
  - Analyzing/constructing graph using intercepts, concavity, vertex
  - Using the quadratic formula to locate intercepts/zeros
- Applications of the above – include piecewise functions (parking rates, cell phone plans)

Process Strand Progression – DRAFT, Rev. 10/26/09 (D. Lee, A. Ehrlich)

Strand	Math 81	Math 91
1. Successful student habits and attitudes	Take Responsibility • Know the class information and policies • Attend class and pay attention • Do homework • Know what resources are available • Seek help when needed • Use study time effectively	Study Effectively • Do the amount of homework needed to succeed • Use all resources appropriately and when needed • Study for exams • Use exams for review • Create a notecard for review or study • Know when it is time to seek outside help
2. Critical-thinking ability	• Analyze a problem to determine the question to be answered and select strategies or procedures to try without an emphasis on formally solving them • Explain how a procedure you learned works	• Analyze, compare, and contrast different procedures and approaches for problems or questions. • When solving a problem, reach a solution when possible, and decide if the answer is reasonable. If not, explain why. • Be able to look at a review list and determine which items need to be reviewed and which items need to be studied.
3. Quantitative reasoning ability	• Give an example where signed numbers are used • Understand the relationship between numbers and the symbols we use to designate those relationships • Choose appropriate types of graphs to represent given sets of data • Defend solutions, procedures and recognize invalid ones	• Know why arithmetic and algebra steps work and be able to use them correctly. • Explain why a process was used to solve a problem and if there are any other processes that might work
4. Effective communication ability	• Use definitions and terms correctly • Be able to explain step by step what work they have done on a problem and when/if they became confused • Be able to display their work in an organized fashion	• Use definitions and terms correctly • Be able to do a written or verbal self evaluation of what they know and what they don't know • Be able to pinpoint their confusion

Process Strand Progression & Connection to TMP – Rev. 10/27/09 (E. Scott)

HCC Strand/ TMP Student Attribute	Math 81 Learning Outcome	Math 91 Learning Outcome
HCC: Successful student habits and attitudes (especially engaging intellectually and taking responsibility for their own learning) TMP: "Takes responsibility for own learning" bullet 4	Describe and use available resources to be successful in math classes. Resources include: class time, books, notes, technology, workshops, peers, tutors, and instructors?	Describe her/his level of understanding before a formal assessment as well as steps she/he will take to improve.
HCC: Critical thinking ability (developing awareness of, and utilizing, a process for solving problems of all types, not just mathematical) TMP: "Perseveres when faced with time-consuming or complex tasks" bullet 2, 3 "Pays attention to detail" bullet 1	Identify the goal and relevant information given in a question or task, then describe some of the steps necessary to complete the task.	Describe and consistently apply an effective strategy for solving problems.
HCC: Quantitative-reasoning ability (interpret, question, estimate, evaluate, defend, and seek implications of graphical and tabular data) TMP: "Demonstrates intellectual engagement" bullet 2	[Not explicit in the outcomes: Asking students to interpret, question, defend, etc. is embedded in the – pedagogy for the course.]	[Same as for Math 81.]
HCC: Effective communication ability (to faculty, peers, and self, especially around their own confusion) TMP: "Takes resp." bullet 3 "Demonstrates intellectual engagement" bullet 3 "Pays attention to detail" (when reviewing work) Math 91 – "Perseveres …" bullet 4	Describe her/his reasoning on a task, including sources of confusion or errors.	Use formal terminology to describe his/her reasoning on a task as well as patterns in his/her errors.
TMP: "Demonstrates intellectual engagement" bullet 1 "Perseveres …" bullets 2, 3, 4	[Not explicit in the outcomes: included in the outline of content as "Apply concepts and skills to situations in everyday life and other college coursework"]	[Same as for Math 81.]

Clarification of our definitions of "Quantitative Reasoning" and "Critical Thinking":

"Quantitative Reasoning" means the abilities necessary to

- interpret and describe quantitative information (*i.e.* describe what a table, graph/diagram, or computation means),
- ask useful questions about data ("useful" questions should show evidence of processing information and facilitate further inquiry or reasoning),
- anticipate results (recognize patterns and trends as well as estimate values),
- justify procedures (using physical reality for arithmetic operations and properties of numbers for algebra), and
- judge reasonability of answers.

"Critical Thinking" means the abilities necessary to

- make sense of a situation (*e.g.* summarize situation and task, identify key information, describe key ideas/concepts/processes relevant to a situation),
- form a strategy to accomplish the task, and
- monitor implementation of the strategy (*i.e.* evaluate progress and modify strategy).

Note: These reflect the cognition described by the "Comprehend," "Analyze," "Synthesize," and "Evaluate" levels of Bloom's Taxonomy.

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COURSE MASTER INFORMATION – REV: 10/28/09 BY E. SCOTT

(INFORMATION TO BE PROVIDED BY DEPARTMENT)

Course Abbreviation	Number	Computer Entry Title for Quarterly *(24 Spaces Only)*
Math	071	Review of Arithmetic

Year & Quarter this course was first offered at Highline:	2002, Spring	Next CAF review date:	Spring 2013

Grading System

☐	Decimal Grade	☒	CR/NC	☐	Other: *(Specify)*

Check Degree Distribution Requirements the Class Meets

Humanities	Soc Science	Math/Science	Lab	Communication	Computation	Phys. Ed.	Diversity & Globalism**	Transferable Elective
☐	☐	☐	☐	☐	☐	☐	☐	☐

***Diversity & Globalism Committee application must be attached. CAF revisions/updates require D&G Committee notification.*

Capacity & Credits

Class Limit	Credit
25	5

Continuous Enrollment

Yes	No
☐	☒

Number of Contact Hours

Lecture	Lab	Worksite	Clinical	Mixed/Variable	Other
55					

Computer Enforced Prerequisite	No
If Permission, List Criteria	
Quarterly Catalog Note	Students should speak with an advisor to decide whether to take Math 071 or an ABE course to improve their arithmetic skills.
Applicable Fees	

Is this a NEW COURSE?

Yes* ☐ **No** ☒

**If yes, attach a completed New Course Justification Form to this when submitted.*

Is this for the 2-year Catalog?

Yes ☒ No ☐

Is an Invasive Procedure Used?

Yes ☐ No ☒

OR

UPDATING or REVISING an existing course?

Does this REPLACE an existing course? Yes* ☒ No ☐

**If yes, list number of the course being replaced.* 061

UPDATING: Check changes being made to the previous CAF for this course.

Change Course Title ☒ Add/Delete Degree Distribution? ☐

Change Course Credit ☐ Include or Change Prerequisite? ☐

List any other changes made:
Changed catalog note and description as well as rephrased course outline and learning objectives.

FULL COURSE TITLE: *(35 Spaces Only for Title)*

Review of Arithmetic

CATALOG DESCRIPTION:

This course is designed for students needing to review the meaning of, and methods for calculating with fractions, decimals, ratios, percents, and proportions. To earn credit for the course, students will have to pass mastery tests in four areas: whole numbers, decimals, fractions, and percents/proportions.

Course Abbreviation and Number

Math 071

Who is this course designed to serve?

Students who are able to compute with whole numbers by hand, and have some previous experience with decimals, fractions, ratios, percents, and proportions.

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Course Outline: *(Organization of content)*

- Brief summary of whole number arithmetic, including order of operations
- Reading, representing, adding, subtracting, multiplying, and dividing decimals (including order of operations)
- Reading, representing, adding, subtracting, multiplying, and dividing fractions (including order of operations)
- Reading, representing, and computing with ratios, percents, and proportions
- Applying these concepts to solve realistic problems will be incorporated throughout the class
- Estimation and calculators will be used at certain points in the course

Student Learning Outcomes of Course **Indicate the desirable results that can be expected to occur from this course experience.** *(These are usually expressed in measurable and observable terms).*		Assessment Methods **Outcomes measured by the following:** *(These categories may be changed.)*					
		Portfolio	Examination	Written Assignments	Projects	Oral Presentations	Other (Indicate specifics below)
1.	Able to add, subtract, multiply, and divide whole numbers	☐	☒	☒	☐	☐	☒
2.	Able to read, represent, add, subtract, multiply, and divide decimals	☐	☒	☒	☐	☐	☒
3.	Able to read, represent, add, subtract, multiply, and divide fractions	☐	☒	☒	☐	☐	☒
4.	Able to read, represent, and compute with ratios, percentages, and proportions	☐	☒	☒	☐	☐	☒
5.	Able to use the correct order of operations in performing arithmetic calculations	☐	☒	☒	☐	☐	☒
6.	Able to estimate and use a calculator to obtain answers when it is appropriate to do so	☐	☒	☒	☐	☐	☒
7.	Able to solve realistic problems involving arithmetic.	☐	☒	☒	☐	☐	☒

Note: Summative assessments of outcomes 1 – 4 will be in the form of mastery tests. All other assessments may include group work, portfolios, presentations, and projects.

College Wide Outcomes (CWO) **Indicate the degree to which this outcome is addressed in this course.**		Scale				
		4=substantially (Key focus)	3=moderately	2=mildly (very limited)	1=not directly addressed	0=not addressed
1.	**Think critically**	☐	☒	☐	☐	☐
2.	**Reason quantitatively**	☒	☐	☐	☐	☐
3.	**Communicate effectively**	☐	☐	☒	☐	☐
4.	**Civic responsibility in diverse and multifaceted environments**	☐	☐	☐	☒	☐
5.	**Information/visual literacy**	☐	☐	☐	☒	☐

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COURSE MASTER INFORMATION REV 10/27/09 BY D. LEE, A. EHRLICH, E.SCOTT

(INFORMATION TO BE PROVIDED BY DEPARTMENT)

Course Abbreviation	Number	Computer Entry Title for Quarterly *(24 Spaces Only)*
Math	081	Introduction to Algebra

Year & Quarter this course was first offered at Highline:	1986	Next CAF review date:	Spring 2013

Grading System

☒	Decimal Grade	☐	CR/NC	☐	Other: *(Specify)*

Check Degree Distribution Requirements the Class Meets

Humanities	Soc Science	Math/Science	Lab	Communication	Computation	Phys. Ed.	Diversity & Globalism**	Transferable Elective
☐	☐	☐	☐	☐	☐	☐	☐	☐

***Diversity & Globalism Committee application must be attached. CAF revisions/updates require D&G Committee notification.*

Capacity & Credits

Class Limit	Credit
32	5

Continuous Enrollment

Yes	No
☐	☒

Number of Contact Hours

Lecture	Lab	Worksite	Clinical	Mixed/Variable	Other
55					

Computer Enforced Prerequisite	CR in HS 061 or Math 061, or COMPASS Pre-Algebra score above 28
If Permission, List Criteria	
Quarterly Catalog Note	Prereq: CR in HS 061 or Math 061, or COMPASS Pre-Algebra score above 28
Applicable Fees	

Is this a NEW COURSE?

Yes* ☐ **No** ☒

**If yes, attach a completed New Course Justification Form to this when submitted.*

Is this for the 2-year Catalog?

Yes ☒ No ☐

Is an Invasive Procedure Used?

Yes ☐ No ☒

OR

UPDATING or REVISING an existing course?

Does this REPLACE an existing course? Yes* ☐ No ☒

**If yes, list number of the course being replaced.* _____

UPDATING: Check changes being made to the previous CAF for this course.

Change Course Title ☒ Add/Delete Degree Distribution? ☐

Change Course Credit ☐ Include or Change Prerequisite? ☐

List any other changes made:
Some content shifted between Math 81 and Math 91. Course will have an increased emphasis on developing reasoning and critical thinking skills as well as successful math behavior skills.

FULL COURSE TITLE: *(35 Spaces Only for Title)*
Introduction to Algebra

CATALOG DESCRIPTION:
A beginning algebra course that develops proficiency in fraction and signed number arithmetic, evaluation of expressions, and solving linear equations in one variable.

Course Abbreviation and Number
Math 081

Who is this course designed to serve?
Students needing a first algebra course

Course Outline: *(Organization of content)*

- Arithmetic of fractions and signed numbers
- Area and perimeter of circles, triangles, and rectangles and volume of boxes

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- Pie, bar and line graphs
- Evaluation and simplification of expressions
- Polynomial arithmetic (division is limited to monomial only)
- Solving linear equations up to the level of ax + b = cx + d
- Emphasis on applying concepts and skills learned to relationships and formulas in everyday life and other college coursework
- Emphasis on developing quantitative reasoning ability and symbolic reasoning ability

Student Learning Outcomes of Course **Indicate the desirable results that can be expected to occur from this course experience.** *(These are usually expressed in measurable and observable terms).*		Assessment Methods **Outcomes measured by the following:** *(These categories may be changed.)*					
		Portfolio	Examination	Written Assignments	Projects	Oral Presentations	Other (Indicate specifics below)
1.	Describe the meaning of and compute efficiently by hand with basic fractions and signed numbers	☐	☒	☒	☐	☐	☒
2.	Use proportions to perform unit conversions	☐	☒	☒	☐	☐	☒
3.	Describe the meaning of and compute dimensions, perimeters, and areas of triangles, circles, and rectangles, and volume of boxes	☐	☒	☒	☐	☐	☒
4.	Construct and interpret pie, bar, and line graphs as well as be able to interpret most "newspaper-type" graphs	☐	☒	☒	☐	☐	☒
5.	Simplify and evaluate a variety of expressions, including polynomials	☐	☒	☒	☐	☐	☒
6.	Solve linear equations in one variable up to the level of ax + b = cx + d	☐	☒	☒	☐	☐	☒
7.	Describe and use available resources to be successful in math classes	☐	☒	☒	☐	☐	☒
8.	Identify the goal and relevant information given in a question or task, then describe some of the steps necessary to complete the task	☐	☒	☒	☐	☐	☒
9.	Describe her/his reasoning on a task, including sources of confusion or errors	☐	☒	☒	☐	☐	☒

Note: Acceptable assessment tools include group work, portfolios, presentations, projects, and mastery tests.

College Wide Outcomes (CWO) **Indicate the degree to which this outcome is addressed in this course.**		Scale				
		4=substantially (Key focus)	3=moderately	2=mildly (very limited)	1=not directly addressed	0=not addressed
1.	**Think critically**	☐	☒	☐	☐	☐
2.	**Reason quantitatively**	☒	☐	☐	☐	☐
3.	**Communicate effectively**	☐	☒	☐	☐	☐
4.	**Civic responsibility in diverse and multifaceted environments**	☐	☐	☐	☒	☐
5.	**Information/visual literacy**	☐	☒	☐	☐	☐

Approval Signatures

Department Coordinator	Date	Division Chair	Date	Secretarial Initial	Dean of Instruction	Date

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COURSE MASTER INFORMATION – REV. 10/26/09 BY E. SCOTT

(INFORMATION TO BE PROVIDED BY DEPARTMENT)

Course Abbreviation	Number	Computer Entry Title for Quarterly *(24 Spaces Only)*
Math	091	Essentials of Interm Alg

Year & Quarter this course was first offered at Highline:	1986	Next CAF review date:	Spring 2013

Grading System

☒	Decimal Grade	☐	CR/NC	☐	Other: *(Specify)*

Check Degree Distribution Requirements the Class Meets

Humanities	Soc Science	Math/Science	Lab	Communication	Computation	Phys. Ed.	Diversity & Globalism**	Transferable Elective
☐	☐	☐	☐	☐	☐	☐	☐	☐

***Diversity & Globalism Committee application must be attached. CAF revisions/updates require D&G Committee notification.*

Capacity & Credits

Class Limit	Credit
32	5

Continuous Enrollment

Yes	No
☐	☒

Number of Contact Hours

Lecture	Lab	Worksite	Clinical	Mixed/Variable	Other
55					

Computer Enforced Prerequisite	1.7 or higher in Math 081 or 085, or COMPASS Pre-Algebra score above 59
If Permission, List Criteria	
Quarterly Catalog Note	Prereq: 1.7 or higher in Math 081 or 085, or COMPASS Pre-Algebra score above 59
Applicable Fees	

Is this a NEW COURSE?

Yes* ☐ **No** ☒

**If yes, attach a completed New Course Justification Form to this when submitted.*

Is this for the 2-year Catalog?

Yes ☒ No ☐

Is an Invasive Procedure Used?

Yes ☐ No ☒

OR

UPDATING or REVISING an existing course?

Does this REPLACE an existing course? Yes* ☐ No ☒

**If yes, list number of the course being replaced.* _____

UPDATING: Check changes being made to the previous CAF for this course.

Change Course Title ☒ Add/Delete Degree Distribution? ☐

Change Course Credit ☐ Include or Change Prerequisite? ☐

List any other changes made:
Substantial content revision. Course eliminates some content from previous version of Math 91 and adds content previously taught in Math 95 and 97. Course will also have increased emphasis on developing reasoning and critical thinking skills as well as successful math behavior skills. Should help students successfully take college-level classes with less remediation.

FULL COURSE TITLE: *(35 Spaces Only for Title)*

Essentials of Intermediate Algebra

CATALOG DESCRIPTION:

An intermediate algebra course that develops understanding of functions (linear, exponential, quadratic) as well as proficiency with simplifying expressions involving integer exponents, solving linear inequalities, and solving linear equations in two variables. GRAPHING CALCULATOR REQUIRED: TI-83 or 84 recommended.

Course Abbreviation and Number

Math 091

Who is this course designed to serve?

Students needing algebraic skills such as graphing formulas, using and analyzing function relationships, and basic statistics.

Course Outline: *(Organization of content)*

- Solving linear equations in one variable having many terms, fractional coefficients, and distributing
- Solving linear inequalities in one variable, and expressing results with graphs and interval notation

- Summarizing data sets using mean, median, mode, the five-number summary, and histograms or box plots
- Concept and notation of functions, domain, and range, including exposure to absolute value and piecewise functions
- Features of functions (max/min, increasing/decreasing, positive/negative, intercepts, rates of change), including using compound inequalities and interval notation to describe them
- Linear functions (concept, intercepts, slope, slope-intercept form, constructing from pairs of points, linear regression)
- Facts about vertical, horizontal, parallel, and perpendicular lines
- Solving systems of equations in two variables by graphical estimation and the elimination method
- Exponential functions (concept, intercepts, asymptotes)
- Simplifying expressions involving integer exponents
- Quadratic functions (concept, constructing graphs using intercepts, vertex, and concavity, finding intercepts using the quadratic formula)
- The Pythagorean Theorem and distance formulas, including estimating and computing roots of numbers
- Emphasis on applying concepts and skills learned to situations in everyday life and other college coursework
- Emphasis on developing quantitative reasoning ability and symbolic reasoning ability
- Training in use of graphing calculator throughout course to evaluate, graph, trace, zoom, change window, and perform regression

Student Learning Outcomes of Course **Indicate the desirable results that can be expected to occur from this course experience.** *(These are usually expressed in measurable and observable terms).*		**Assessment Methods** **Outcomes measured by the following:** *(These categories may be changed.)*					
		Portfolio	Examination	Written Assignments	Projects	Oral Presentations	Other (Indicate specifics below)
1.	Complete a variety of algebraic tasks, including calculating with radicals, simplifying exponential expressions, and solving linear equations, inequalities, and systems of linear equations	☐	☒	☒	☐	☐	☒
2.	Define measures of center and spread, then use them to summarize meaningful data numerically and graphically	☐	☒	☒	☐	☐	☒
3.	Define the concepts of function, domain, and range, then compute and describe features of several function types	☐	☒	☒	☐	☐	☒
4.	Define and identify slope, intercepts, and slope-intercept form, then use them to describe and construct linear equations and graphs for realistic situations	☐	☒	☒	☐	☐	☒
5.	Define and describe the features of exponential functions, then apply them to realistic situations	☐	☒	☒	☐	☐	☒
6.	Define quadratic functions, then compute features of their graphs and solve quadratic equations	☐	☒	☒	☐	☐	☒
7.	Describe her/his level of understanding before a formal assessment as well as steps she/he will take to improve	☐	☒	☒	☐	☐	☒
8.	Describe and consistently apply an effective strategy for solving problems	☐	☒	☒	☐	☐	☒
9.	Use formal terminology to describe his/her reasoning on a task as well as patterns in his/her errors	☐	☒	☒	☐	☐	☒

Note: Acceptable assessment tools include group work, portfolios, presentations, projects, and mastery tests.

College Wide Outcomes (CWO) **Indicate the degree to which this outcome is addressed in this course.**		**Scale**				
		4=substantially (Key focus)	3=moderately	2=mildly (very limited)	1=not directly addressed	0=not addressed
1.	**Think critically**	☐	☒	☐	☐	☐
2.	**Reason quantitatively**	☒	☐	☐	☐	☐
3.	**Communicate effectively**	☐	☒	☐	☐	☐
4.	**Civic responsibility in diverse and multifaceted environments**	☐	☐	☐	☒	☐
5.	**Information/visual literacy**	☐	☒	☐	☐	☐

Sample Math 81 Schedule – Proposed by Diana Lee, with alternate pathway by Erik Scott (4/29/09)

WEEK	CONTENT	MASTERY TEST	PROCESS EMPHASIS	ALTERNATE PATHWAY
1 – 2 (Skill devel.)	What is a number/signed number? Arithmetic of signed numbers and fractions (Absolute value for computation)		1 - Attend class, pay attention, know info and policies Resources – where to find them, when to use them	Weeks 1 – 2: Measurement activities to develop • Unit conversion • Geometric formulas • Fractions
3 (Apply)	Newspapers/graph reading	signed number arithmetic	2 – determine what needs to be answered/what is the questions 3 - QR - Emphasis on what the numbers represent and the relationships between them	Week 3: Concept of integers • Directionality • Practical value
4 – 5 (Skill devel.)	Numeric and Algebraic expressions – order of operations (includes integer exponents)		1 - How to use homework and tests to help you learn Resources – where to find them, when to use them	Week 4: Formula evaluation • Order of operations • Real-world formulas
6 (Apply)	Budgets and some formula evaluation	algebraic/numeric expression simplification	3 - QR - Emphasis on what the numbers represent and the relationships between them QR – reasonableness of what we get for answers	Weeks 5 – 6: Data and Graphs • Interpret pie/bar/line graphs • Interpret data sets • Represent data graphically
7 – 8 (Skill devel.)	Solving linear equations (Babie/Amy – include some inequalities)		4 – How do you ask for help? How do we communicate what we know and what we don't know and what we need to know?	Weeks 7 – 8: Simplifying expressions • Manipulating formulas • Extension of # algorithms
9 (Skill)	Geometry- something hands on and formula evaluation	linear equations	3 - QR - Emphasis on what the numbers represent and the relationships between them	Weeks 9– 10: Solving equations • Basic linear equations & inequalities
10 (Apply)	Project Work (Examples?: Formulas for grade computation, budgets)		Individual projects –putting it together – project should mean something to the student	
FINALS	Project Presentations			

Possible "takeaways": Budgeting (incl. interest), Grade computation, Choosing a cell phone plan, Using a spreadsheet, Summarizing articles from newspapers or magazines that include statistics and graphs

Sample Math 91 Schedule – Proposed by Diana Lee (5/6/09)

WEEK	CONTENT	MASTERY TEST	PROCESS EMPHASIS
1 – 2	Data Behavior – looking at data sets and range, mean, median, max, min Scientific notation??		1 - Attend class, pay attention, know info and policies Resources – where to find them, when to use them
3 – 4	Looking at function behavior in broad terms • Domain, range • Maxes and mins • Increasing, decreasing • Positive, negative • Zeros • Average rate of change		Analyze, compare, and contrast different approaches for problems or questions Check reasonableness of answers Be able to articulate when you are stuck, and where it breaks down.
5 – 6	Sets of functions • Linear • Quadratic • Absolute Value • Square Root	Being able to analyze a given function's behavior and predict behavior	Self-evaluation Use exams for review
7	Spreadsheet or equivalent work		
8 – 9	Polynomial functions: +, –, × Equations, inequalities containing linear functions		Analyze, compare, and contrast different approaches for problems or questions Check reasonableness of answers Be able to articulate when you are stuck, and where it breaks down.
10	Formulas	Polynomial arithmetic	Use exams for review
FINALS			Self-evaluation

Possible "takeaways": Provide several examples of (non) functions outside the classroom, Choosing a cell phone plan (esp. with piecewise functions), Using a spreadsheet, Investment/growth projections using exponential functions

(See next page for alternate pathways)

Alternate Math 91 Schedules – proposed by Amy Ehrlich, Barbara Hunter, Erik Scott, Aaron Warnock (5/6/09)

AMY	BARBARA	ERIK	AARON
Data and graph types	Week 1: Solving more complex linear equations & inequalities	Week 1: Solving more complex linear equations and inequalities	Week 1: Solving more complex linear equations
Functions	Week 2: Data sets • 5-number summary	Week 2: Summarize, display data • 5-number summary	Week 2: Graphing linear functions (slope, intercepts)
Linear equations (w/ regression)	Week 3: (Linear) regression	Week 3: Patterns in data • Recognizing features (increase/decr, rate of change) • Domain & range (intervals) • Curve-fitting	Week 3: Intro to functions • Domain & range with inequalities • Patterns in graphs
Quadratic functions	Week 4: Concept of functions • Input/output idea • Domain & range • Fns in graphs/words/data/sym	Week 4: Concept of functions • Input/output idea • Domain & range (intervals) • Fns in graphs/words/data/sym	Week 4: Systems of equations • Breakeven analysis
Exponential functions	Weeks 5 – 6: Linear functions • Basic facts (slope, intercepts) • Solving systems	Week 5: Linear functions • Basic facts (slope, intercepts)	Week 5: Roots & exponentials
	Weeks 7 – 8: Quadratic functions	Weeks 6 – 7: Exponential fns • Growth pattern • Application (finance, pop.) • Algebra of exponents	Weeks 6 – 8: Other functions • Quadratic • Exponential • Piecewise
	Weeks 9 – 10: Exponential fns	Week 8: Quadratic functions • Formula approach to concavity, vertex, intercepts	Weeks 9 – 10: Statistics • 5-number summary • Regression
		Week 9: Quadratics & radicals • Solving quad. eqns with quadratic formula • Basics of square/cube roots	
		Week 10: Systems of equations • Breakeven analysis	

Sample Math 98 Schedule – Proposed by Erik Scott (5/25/09)

WEEK	CONTENT	MASTERY TEST	PROCESS EMPHASIS
1	Polynomial Arithmetic • Multiplication review • Polynomial division		
2	Factoring Trinomials • Monic ($a = 1$) by guess 'n check • General by algorithms		
3	Factoring special cases Rational expressions • Simplifying • Multiplying • Dividing		
4	Combining rational expressions • Finding LCDs • Adding • Subtracting		
5	Solving rational equations		
6	Solving quadratic equations • Factoring • Completing the square		
7 – 8	Simplifying & solving with radicals • Converting to rational exponents • Simplifying • Multiplying/Dividing • Adding/Subtracting • Solving radical equations		
9	Solving absolute value equations		
10	Algebraic modeling of traditional word problems		

Comparison chart: Current topics & their placement in the new course sequence – Aaron Warnock (5/13/09)

Current Content		Math 81N	Math 91N	Math 98	Notes
Old Math 81	Arithmetic of Signed numbers	C			C = Covers topic to similar level of depth D = Different approach m = minimal coverage of topic
	Simplify expressions	C			Like terms, distributing, no division
	Solve linear equations	D	C		81N: Expect $ax+b=cx+d$; $a(bx+c)=d$
	Formulas	C			Evaluating, simplifying literal equations
	Percents	C			More depth – application
	Problem Solving	D	D	C	Focus on analyzing genuine questions, less on algebraic modeling (modeling reserved for 99)
	Linear Inequalities	m	D		81N: Concept of inequality 91N: Solve linear, use compound for intervals to describe function domain/range
	Exponent rules	m	C		81N: Definition, product rule, quotient rule 91N: All rules, intro to integer/rational exp.
	Polynomial Arithmetic -adding and subtracting -multiplying -dividing	 C C m		 C	 81N: Mult up to FOIL, division of monomials 98: Full polynomial division
	Scientific Notation	m			81N: Focus on interpretation, not computation
	Cartesian Coordinate System	m	C		81N: Reading line graphs/plots
	Graphing linear equations (basic)		C		"Basic" refers to graphing by point-plotting

Comparison chart: Current topics & their placement in the new course sequence – Aaron Warnock (5/13/09)

Current Content		Math 81N	Math 91N	Math 98	Notes
Old Math 91	Graphing linear equations -Intercepts -Slope & Rate of Change -Slope-intercept form -Parallel and perpendicular lines		C C C m		91N: Concept and basic facts of parallel & perpendicular lines are presented
	Forms of linear equations		D		91N: Focus on slope-intercept form
	Graphing 2-var. linear inequalities				**ELIMINATED** – taught when needed in 111
	Solving Systems of Linear Equations -graphing -substitution -elimination		C (optional) C		91N: Focus on solving via elimination; graphing used to highlight idea, estimate rapidly
	Factoring			C	
	Solving quadratic equations (factoring)			C	
	Rational Expressions -Simplifying -multiplying & dividing -adding and subtracting			C C C	
	Complex Fractions				**ELIMINATED**
	Solving rational equations			C	
	Proportions	C			81N: Included with unit analysis

Comparison chart: Current topics & their placement in the new course sequence – Aaron Warnock (5/13/09)

Current Content		Math 81N	Math 91N	Math 98	Notes
Old Math 97	Graphing linear equations (repeated)		C		91N: Emphasis is on slope-intercept form; parallel/perpendicular line facts mentioned
	Linear Regression		C		
	Functions (Concept, D & R, etc.)		C		
	Linear Inequalities		C		
	Compound Inequalities		m		No solving – used only to highlight meaning of intervals
	Absolute Value Equations			C	
	Absolute Value Inequalities				**ELIMINATED**
	Graphing 2-var. linear inequalities				**ELIMINATED** – taught when needed in 111
	Solving Linear Systems (repeated)		m		91N: Focus on solving via elimination
	Radicals and Radical Functions -Rational exponents -Simplifying radical expressions -Add/subt/mult radical expressions -Rationalize denominators -Solving radical equations			 C C C C	**ELIMINATED** rationalizing of denominators
	Complex numbers (no division)			C	
	Solving Quadratic Equations -Factoring -Completing the square -Quadratic formula		 C	 C C C	
	Analyzing graphs of quadratic functions -Concavity -Vertex -Intercepts		 C C C		98: Shifting approach?
	Non-linear inequalities				**ELIMINATED**

Proposed Themes and Takeaways:

General Notes	Math "80" (rev: Fall 08)	Math "90" (rev: Fall 08)	Math "99" (rev: Fall 08)

• What elements can be embedded in the courses such that they automatically become engines for pedagogical change & instructor development?
• What are the student "take-aways"?
  ○ Practical skill/ability
  ○ Two math concepts which provide a new insight into/awareness of the world around them
  ○ Knowledge which will be reinforced in other academic courses
• Each course has two mastery requirements – one algebraic, one conceptual
 	
• **Ways to bring in multicultural material/ knowledge?**
  ○ Have students write their own problems ("Describe a situation or question in your life which reflects a linear relationship)
  ○ Use open-source book into which we can insert bios
• **THE THEMATIC FOCUS PROVIDES A BASIS FOR MEANINGFUL COORD. STUDIES W/ COLLEGE-LEVEL COURSES!!**
	Reasoning and computing with data
	• Teach with spreadsheet program (open source/Excel)
	• Tangible – topics introduced in context, physical experience when possible (units, scientific notation, geometry, graphing class data)
	Take-aways
	• Basic skills with a spreadsheet – use formulas, construct graphs
	• Justifying your position/ reasoning matters; Opposites & cancellation; relationships & constraints; rigidity of equality vs. bounding of inequalities; operations as actions on things
	• Formulas for grade computation – weighted grades & predicting; a few essential sci/bus formulas (PV=nRT, D=RT, Markup?)
	Mastery requirements
	• Solving lin eqns
	• Can analyze student work & justify methods?
		Patterns in data
		• Awash in data sets – organizing, summarizing, interpreting
		•
			Intensive algebra
			•

Parallels with Developmental Writing – Erik Scott (5/09)

Writing 71 – Writing for Non-Native Speakers
- Accurate sentence construction (tenses/forms/end punctuation)
- Increase vocabulary
- Meaningful sentences with clear syntax; formatting multiple paragraphs

Math 71 – Review of Arithmetic
- Accurate computation with decimals, fractions; confirm skills with whole numbers
- Increase experience with physical reference points for numbers (experience #s as quantity and measurement)
- Using proportional reasoning; interpret and use ratios, percents, and proportions

Writing 81 – Developmental Writing
- Analyze & follow assignments/directions
- Multi-paragraph responses
- Logical coordination/subordination of clauses, sentences, ideas
- Development of coherence, ability to develop ideas, patterns of thought
- Edit for errors
- Clear syntax appropriate for academic English

Math 81 – Introduction to Algebra
- Analyze & follow assignments/directions
- Multi-step solutions/responses
- Logical reasoning through process of analysis or solution
- Recognize & correct own errors
- Appropriate vocabulary and notation for mathematics

Writing 91 – College Prep Writing
-

Math 91 – Essentials of Intermediate Algebra
-

Writing 98 – (Writ 91 redux)
-

Math 98 – (Algebra for precalculus – Advanced Math 91)
-

Restrictions on Math "90" to ensure student success in 100-level courses – Barbara Hunter, Amy Ehrlich, Diana Lee (5/09)

For Math 107, students need:

- Basic statistics [for census/survey, graphs/summarizing data, probability, distributions]
- Ability to interpret/analyze visual representations [circuits/networks, scheduling, symmetry, graphs/summarizing data]
- Concept/calculation of percentage change [money matters, growth models]
- Exponential functions [money matters, growth models]
- Reasoning ability – can think more broadly than just executing an algorithm, can cope with having more than one possible answer [most topics]
- Proficiency with basics of graphing calculator
    - Evaluate formulas
    - Generate graphs, trace, change window, use table
    - Enter, plot, clear lists

For Math 111, students need:

- Solid knowledge of linear equations and graphing (esp. finding equations of a line, intercepts, interpreting slope)
- Experience solving systems of linear equations in 2 variables
- Experience with quadratic equations and graphs (formula approach sufficient, finding intercepts, vertex)
- Basic understanding of solving rational/radical equations (often appear in 111 HW problems; concept of "clear denominators" or "square/cube to remove radical"?)
- Knowledge of function concept/notation and exposure to piecewise-defined functions
- Knowledge of exponential function facts (??)
- Knowledge of solving equations using radicals (*e.g.* solving $a_n = a_1 r^{n-1}$ for r)
- Simplifying rational expressions (esp. difference quotient)
- Graphing calculator skills (see 107 for details)

For Math 112, students need much greater algebra proficiency, and need to have completed Math 99 previously. (Taking 99 & 111 concurrently is acceptable.)

For Math 210, students need: (Babie needs to verify)

- Able to clear variable denominators (Chebyshev: $1-\frac{1}{k^2}=0.75$)

- Ability to work with formulas involving complicated symbols ($n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$)
- Graphing calculator skills (see 107 for details)
- Basic knowledge of methods for summarizing data
- Experience analyzing and interpreting graphs and data sets
- Reasoning ability – can think more broadly than just executing an algorithm, can cope with having more than one possible answer [most topics]

Translation of old Math 81 learning outcomes to a grading system and explicit subtasks – Erik Scott (9/21/09)

Prerequisite: Completion of Math 61 or equivalent. (Can do fraction and decimal arithmetic by hand.)

Course Summary

Math 81 introduces you to the idea of a variable – a symbol (like "*x*") that can be written in place of a numeric quantity you do not already know. You will be taught how to add, subtract, multiply, and divide numbers and variables to create formulas and equations which represent relationships between quantities: for example, gross pay is usually calculated by multiplying the number of hours worked by the person's pay rate; in symbols, this could be written $Gp = H \times Pr$. This is the basic goal of algebra – using symbols to represent relationships, and then using arithmetic rules to compute information you didn't already know.

Learning Goals – At the end of this course you should be able to

1. describe the meaning of, and compute efficiently by hand with basic fractions and signed numbers,
2. correctly set up and compute proportions,
3. describe the meaning of, and compute with percentages,
4. describe the meaning of and compute dimensions, perimeters, and areas of rectangles, triangles, and circles,
5. construct and interpret pie, bar, and line graphs for given data tables and formulas,
6. evaluate a variety of formulas by substituting values for variables and using the order of operations,
7. simplify algebraic expressions using the properties and order of operations,
8. solve linear equations in one variable,
9. solve linear inequalities in one variable,
10. use available resources effectively,
11. make sense of a question or task involving measurement or data,
12. recognize situations that require specific mathematical concepts or techniques, and
13. explain and justify your methods, as well as articulate the source(s) of your confusion or error.

Grading System

% of Total Grade	Learning Outcome(s)
10% **with Proficiency**	Arithmetic of Fractions
10% **with Proficiency**	Arithmetic of Signed Numbers
10% **with Proficiency**	Evaluation of Formulas
20% **with Proficiency**	Solving Linear Equations in One Variable
20%	Other Algebra – Simplifying expressions, Solving Linear Inequalities
20%	Other Mathematics – Proportions, Percents, Geometry, Statistics
10%	Processes – Habits & Attitudes, Critical Thinking, Quantitative Reasoning, Effective Communication

Notice that your grade is based on the learning outcomes, not specific assignments or exams. This tells you that I recognize students learn at different rates, and therefore should have multiple opportunities throughout the quarter to demonstrate their understanding. I will check your understanding using a variety of tasks, ranging from written assignments and online practice problems to timed quizzes and exams. At any time, your "grade" in a particular row of the table above **is the higher of** your grade on that portion of the most recent exam OR your average score on all assignments related to that row. Your overall grade will be computed using a linear scale with a 4.0 for a total of 95% or more, and approximately a 2.0 for a total of 70%.

The "with Proficiency" requirement means you must earn 80% or higher on those sections of the in-class tests by the end of the quarter in order to receive a passing grade, regardless of your performance on the other outcomes.

Expanded Description of Math 81 Student Learning Outcomes – At the end of this course you should be able to

1. describe the meaning of, and compute efficiently by hand with basic fractions and signed numbers. [Numeracy]
    a. +, –, x, / pairs of fractions with unlike denom & #s < 26
    b. +, –, x, / pairs of integers w/ abs val < 51
    c. Explain using words and diagrams (linear and area) what each number in a fraction means.
    d. Explain using words and diagrams (arrows, undo/dir. difference) how to interpret sums and differences of integers.
2. correctly set up and compute proportions. [Numeracy]
    a. use ratios and "matching labels" process to convert between different units
    b. recognize uniform scaling of lengths/distances as proportions
3. describe the meaning of, and compute with percentages. [Numeracy]
    a. describe percentages as parts of a whole
    b. rapidly convert between decimals and percentages
    c. associate key reference percentages – 25, 33, 50, 66, 75% – with their fractions and images along a line or in a pie
4. describe the meaning of and compute dimensions, perimeters, and areas of rectangles, triangles, and circles. [Geometry]
    a. explain the concepts of perimeter and area in words
    b. identify appropriate units for perimeter and area, as well as explain why area is measured in square units
    c. choose the correct formula for a particular computation from a given list of formulas
    d. compute dimensions of a shape from other information (may require solving equations)
5. construct and interpret pie, bar, and line graphs for given data tables and formulas. [Statistics]
    a. when constructing a graph, include a title, category labels, and be reasonably accurate with scales and placement of data
    b. graph formulas by first repeatedly evaluating the formula to create a data table
    c. correctly describe the meaning of individual dots, bars, or sectors on a graph as well as draw conclusions by comparing two or more of those objects

6. evaluate a variety of formulas by substituting values for variables and using the order of operations. [Formulas]
7. simplify algebraic expressions using the properties and order of operations. [Formulas]
    a. use the distributive property to remove parentheses, including when a negative is present
    b. describe and use the criteria for identifying "like terms"
    c. describe and use the criteria for changing exponents of variables
    d. add and subtract polynomials of various sizes and numbers of variables
    e. multiply mono- and binomials, divide monomials
8. solve linear equations in one variable. [Formulas]
    a. consistently solve equations of the forms $ax+b=c$, $a(x+b)=c$, $ax+b=cx+d$ when the coefficients are integers or contain at most two fractions
    b. verify answers are correct
9. solve linear inequalities in one variable. [Formulas]
    a. consistently solve inequalities of the forms $ax>b$, $x+a>b$, $ax+b>c$ (any inequality may be used)
    b. describe solutions to inequalities in words and using number lines with brackets or parentheses
10. use available resources effectively. [Successful habits and attitudes]
    a. create organized summaries of class information (lectures, online materials)
    b. locate and summarize terms, concepts, and procedures contained in the textbook
    c. memorize definitions and steps of procedures
    d. work with peers, tutors, and your instructor outside of class, as appropriate
11. make sense of a question or task involving measurement or data. [Critical Thinking]
    a. determine what a question asks you to do
    b. identify relevant facts and relationships between quantities
    c. make a plan of action
12. recognize situations that require specific mathematical concepts or techniques [Quantitative Reasoning]
    a. recognize situations involving proportions, especially those involving uniform scaling of lengths/distances
    b. recognize when percentages are applicable, and correctly set up an equation when computations are required
    c. choose appropriate types of graphs to represent given sets of data
13. explain and justify your methods, as well as articulate the source(s) of your confusion or error. [Com. Effectively]
    a. describe and defend steps of a calculation or problem-solving strategy to peers, tutors, and faculty
    b. when confused, be able to describe the words, patterns, or features of a problem, or the conflicting ideas that are leading to confusion
    c. when an error was made, be able to explain the reasoning (including relevant concepts or procedures) that led to each step